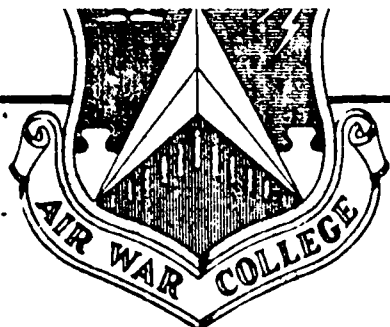


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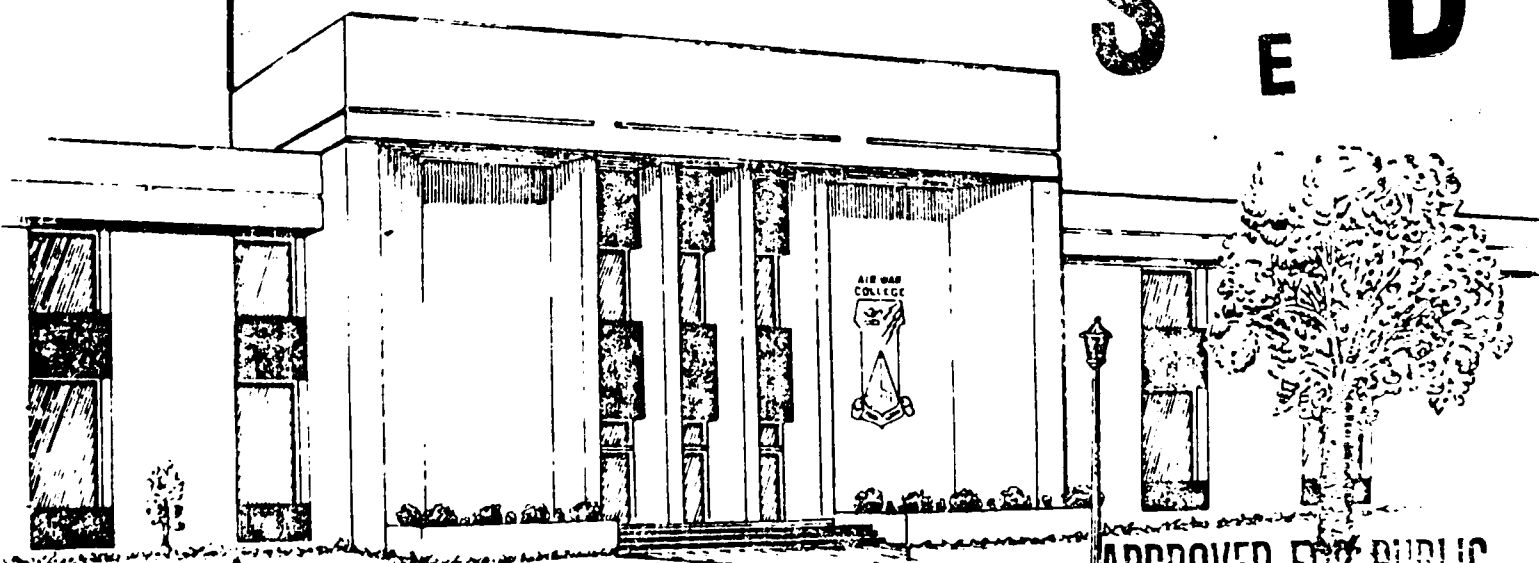
RESEARCH REPORT

REGIONAL CORROSION CONTROL FACILITIES

COLONEL RAYMOND W. DAVIES

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AIR UNIVERSITY
UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

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REGIONAL CORROSION CONTROL FACILITIES

by

Raymond W. Davies
Colonel, USAF

A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Mr Theodore M. Kluz

MAXWELL AIR FORCE BASE, ALABAMA

May 1990

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EXECUTIVE SUMMARY

TITLE: Regional Corrosion Control Facilities. AUTHOR: Raymond W. Davies, Colonel, USAF

The USAF Regional Corrosion Control Facility (RCCF) at Bergstrom Air Force Base, Texas, the first of four such facilities programmed, has been operational since January 1987. The other three are yet to be funded. After gaining three years of operational experience at the Bergstrom RCCF, it is obvious that the facility has contributed to satisfying Air Force needs and should continue in operation. However, one facility, operating under the current concept, can not satisfy the overall requirement. There is a current backlog of 577 F-15 and F-16 aircraft in TAC alone that are over six-years-old, have at least five coats of paint on them and have never been stripped. The NGB has a backlog of 100 F-15s, 350 A-7s, and 100 A-10s. AFRES has a backlog of 100 F-16s and 97 A-10s. It would take four to five years to put the three remaining RCCFs in operation--the need is now. Rather than constructing three more RCCFs, contractor owned and operated facilities should be sought as an alternative that could be put in operation within one year. The operation of the Bergstrom RCCF should be expanded to maximize the facility capability and services performed should be geared to specific command needs.

BIOGRAPHICAL SKETCH

Colonel Raymond W. Davies, USAF, is a 1990 graduate of the Air War College. He has a BS and MS in Industrial Management from Clemson University. He is an Aircraft Maintenance Officer with experience on RF-4C, F-4E/G, and F-15 C/D tactical fighter aircraft. He has served previously as both an Aide-de-Camp and an Executive Officer. He has functioned as an Aircraft Maintenance Unit Officer in Charge, an Organizational Maintenance Squadron Maintenance Supervisor, an Aircraft Generation Squadron Maintenance Supervisor, an Aircraft Generation Squadron Commander, and an Assistant Deputy Commander for Maintenance twice--once in USAFE and once in TAC. He has served on the TAC Deputy Commander of Logistics' staff twice. He was Chief of the Briefing and Analysis Division on his first tour. On the second tour, he was the Assistant Chief of the Weapon System Development Division, then Chief of Weapon System Acquisition Division. While functioning in this capacity, he supervised the TAC Corrosion Control Program Office and served as the Project Officer for the first USAF Regional Corrosion Control Facility at Bergstrom Air Force Base, Texas. He is a 1981 graduate of the Armed Forces Staff College and has completed Squadron Officer School, Air Command and Staff College, and the Industrial College of the Armed Forces, National Security Management Course--all by correspondence.

TABLE OF CONTENTS

DISCLAIMER.	ii
EXECUTIVE SUMMARY	iii
BIOGRAPHICAL SKETCH	iv
Chapter	
I. INTRODUCTION.	1
Background.	1
II. THE USAF REGIONAL CORROSION CONTROL FACILITY (RCCF) AT BERGSTROM AFB, TEXAS	10
Background.	10
Operation of RCCF	11
Problems.	12
Facility Construction Problems.	13
Waste Treatment Shortfall	13
Government Manning Problems	19
Contractor Performance Problems	20
Operational Funding Problems.	23
RCCF Production	24
Assessment of RCCF.	28
Potential for Increased Production.	30
The Potential for Problems with New Contract.	31
III. ANALYSIS OF NEEDS VERSUS CAPABILITY	33
IV. ANALYSIS OF ALTERNATIVES.	39
USAF RCCF at Bergstrom AFB.	39
Type and Distribution of Aircraft Scheduled	40
Method of Stripping	40
Facility Alternations at the RCCF	41
Should the Remaining Three Programmed RCCFs at Langley AFB VA, Luke AFB AZ, and Rickenbacker ANGB OH be Constructed?	42
Langley AFB VA RCCF	44
Luke AFB AZ RCCF.	46
Contractor Owned and Operated Facilities.	47
ALC Depot Facilities.	48
System Program Manager (SPM) Contracts to Augment Depot Capability.	48
V. CONCLUSION AND RECOMMENDATIONS.	49
Figure 1: Chemical Stripping	15
Figure 2: Chemical Stripping	15

Figure 3: Plastic Media Blast Stripping.17
Figure 4: Plastic Media Blast Stripping.17
Figure 5: USAF Regional Corrosion Control Facility Layout, Bergstrom AFB, Texas.43
Figure 6: Proposed Layout for Future RCCFs45
APPENDIX A: Table 1,52
APPENDIX B: Table 2.53
APPENDIX C: Table 3.54
LIST OF REFERENCES.55
GLOSSARY.58
AU Form 555	
AU Form 509	
AU Form 509A	

CHAPTER I

INTRODUCTION

Background

All aircraft, like automobiles and ships, are subject to corrosion. The severity of the problem is influenced by factors such as the environment in which the aircraft operate--proximity to salt water frequency of low-level flying over salt water and exposure to chemical agents used for melting ice on runways and taxiways--and the effectiveness of the aircraft corrosion prevention and treatment program. An inadequate corrosion control program can cut the serviceable life expectancy of an aircraft due to structural integrity problems or could even cause an aircraft accident due to metal fatigue-induced structural failures.

An effective corrosion control program starts with the manufacturer. The entire aircraft skin must be treated with a corrosion inhibiting agent; then it must be primed, painted, and have exterior markings applied. Once the aircraft arrives at the owning unit, that unit must establish an effective corrosion treatment and prevention program to maintain the integrity of the aircraft coating system. Unit programs range from the cleaning of residue fuel, oil, and hydraulic fluids normally present after flight to periodic washing of the aircraft on a

prescribed interval based on the operational environment. Periodically, the aircraft receive in-depth corrosion inspections. Any corrosion detected must be treated and then the aircraft must be scuff sanded--outer paint coating roughed-up--primed and repainted. The aircraft coating can be touched up in part or repainted in its entirety. While the primary goal of any corrosion control program is to prevent corrosion, another important goal is to maintain the professional appearance of the aircraft. As aircraft get older, paint accumulates from repeated paint applications. Although the units scuff sand the aircraft prior to priming and painting, this removes only a portion of the outer coating; therefore, paint buildup occurs. There are two problems associated with the accumulation of paint; it adds additional weight to the aircraft (55-80 pounds per coat) and it can conceal possible surface corrosion and cracks. Since units at base level do not have the capability of stripping aircraft to the bare metal due to environmental restrictions on the use of chemical stripping agents and the costly requirements for waste treatment facilities, aircraft must be stripped at depot facilities--usually in conjunction with periodic depot maintenance (PDM) or during depot modification programs. Intervals for such stripping and painting of the aircraft are normally established by the system program managers responsible for the weapon system.

The USAF Corrosion Control Program Office has actively attempted to identify corrosion control facility requirements in

an effort to aid base-level units in securing the necessary major construction project (MCP) funding to support corrosion control facility needs. Recognizing deficiencies in AFLC's ability to conduct periodic stripping and painting of aircraft at depot facilities, the Corrosion Control Program office sought alternative solutions for combatting the shortfall. With the Environmental Protection Agency's (EPA) tightening of the use of chemical stripping agents to remove paint from aircraft, alternative stripping methods have been studied. One possible alternative--plastic media blasting--will be discussed in more detail in Chapter II.

In 1981, Battelle Institute conducted a study for the USAF Corrosion Control Program Office on aircraft corrosion control facility requirements. They analyzed requirements through 1995 by geographic region--Europe, Far East, and the Continental United States (CONUS). They suggested the continued use of centralized contractor facilities in Europe and the Far East. They identified a significant shortfall for fighter and smaller sized aircraft and helicopters in the CONUS. Recommendations to remedy the shortfalls were presented along with construction cost estimates.⁽³⁾

The Battelle study served as the basis for the 1981 Corrosion Prevention and Control Facilities Requirements Plan developed by the Service Engineering Division of Headquarters, Air Force Logistics Command, Deputy Chief of Staff Logistics Operations in cooperation with the USAF Corrosion Control

Program Office. To date, 28 of the construction projects recommended in this plan have been funded.^(2:1-5)

This study is limited to one of Battelle's recommendations that called for establishing four regional corrosion control facilities (RCCF) within the CONUS to augment AFLC's capability to strip, corrosion treat, and paint fighter-sized aircraft and helicopters not receiving periodic depot maintenance (PDM).⁽³⁾ This included 15 different types of aircraft and helicopters belonging to Tactical Air Command (TAC), Military Airlift Command (MAC), Air Force Systems Command (AFSC), Air Force Reserves (AFRES), and the National Guard Bureau (NGB).

TAC offered to build and operate three of the recommended facilities, and the NGB offered to build and operate the remaining one. Program Decision Package (PDP) S-558, a HQ USAF initiated PDP, provided funding for the construction of one RCCF at Bergstrom AFB, Texas (Host Command--TAC) in the FY84 Military Construction Program (MCP). The facility was completed and began operation in January 1987.⁽⁴⁾ The remaining three RCCFs have yet to be funded.

This study will examine the operation of the USAF RCCF at Bergstrom AFB, review problems experienced, assess its effectiveness in reducing the backlog of aircraft to be stripped, corrosion treated and painted, and offer recommendations for the future operation of the facility. Based on problems experienced and lessons learned at the Bergstrom

RCCF and changes that have taken place since Battelle's 1981 study that recommended four RCCFs be established, this paper will analyze the need for the remaining three facilities and will offer alternative solutions for combating the existing backlog of aircraft.

The Problem--Since the 1981 Battelle study, one major change has taken place. TAC has developed the capability for complete overspray aircraft painting at each of its bases. TAC has had numerous corrosion control facility major construction projects and has developed low cost (\$500,000) paint booth inserts, complete with the necessary mechanical ventilation systems, fire suppression systems and explosion proof lighting systems. The inserts can be located within existing hangars or can be constructed within "Butler" buildings made specifically to house the insert. Seven of these booths were installed in 1988-89, using equipment funds, at various bases throughout the command, thus eliminating the need for multi-million dollar corrosion control major construction projects.

The philosophy in TAC, which began with General Creech, was that good looking aircraft, like "Indianapolis 500" race cars, get maintained better, fly better (have less pilot reported discrepancies), and instill pride in both the maintenance crew chief and the pilot. Consequently, the technical order 1-1-4 (Standard Exterior Finishes for USAF Aircraft) guidance, which states that an aircraft will be completely stripped every six years and receive a complete mid-life overcoat at the three-

year-point, was ignored by TAC units--three year paint intervals were insufficient to maintain good looking aircraft. Although the technical order further states that spot painting is authorized as needed to preserve the integrity of the coating system, it is nearly impossible to match the existing weathered coating--the result is a spotted appearance. Aircraft need to be painted more frequently than every three years to maintain a professional appearance. Most TAC units paint their aircraft once per year. Some aircraft, designated as "Wing" or "Squadron Commander" aircraft, usually get painted more frequently. New TAC guidance was recently published in TAC Regulation 66-11, (Equipment Maintenance Corrosion Control Program), dated 5 December 1989, which states that units should not perform complete overspray painting more frequently than once every 18 months. Commanders' aircraft were exempted from this restriction.⁽⁵⁾ The basic problem driving units to paint aircraft on an annual basis is that existing aircraft cleaners do not enable "maintainers" to adequately clean the normal dirt, oil, grease, and fuel residue common to most aircraft after flight. Most existing cleaners, authorized for use on aircraft, cause spotting after continued use. The ideal cleaner must remove the grease and grime residue easily without spotting, thus reducing the need to paint as frequently in order to maintain a professional appearance. It has been argued that painting aircraft at more frequent intervals is costly and causes paint buildup at an accelerated rate. While this is true, it is difficult to weigh the cost of maintaining a

professional appearance against the derived benefit of improved quality of maintenance. Improved quality translates into increased aircraft reliability, mission capable rates, readiness and improved combat capability. If this improvement in the quality of work performed by a motivated aircraft "maintainer" prevents a single aircraft accident, a \$20-30 million asset may be saved--not to mention the value of a possible lost aircrew member. The TAC Commander, General Robert D. Russ, recently stated: "Since 1980, the overall TAC aircraft MISHAP rate is down 53 percent, a figure which equates to 235 aircraft and 166 aircrew members saved--a \$4.6 billion savings in assets!"⁽³¹⁾ While all these savings cannot be attributed to improvements in quality of maintenance performed, certainly in fairness some can.

The accumulation of layered top coats of paint on aircraft does cause some problems. Each coat adds 55-80 pounds of weight depending on the size of the surface area of the aircraft. The scuff sanding of the aircraft required before painting removes only a small percentage of the existing top coat--15-20 pounds--a net increase of 40-60 pounds per coat of paint.⁽⁶⁾ The average TAC aircraft has six top coats of paint on it--some as many as ten. The depots and the RCCF claim to have stripped some aircraft with as many as 18 coats. While this added weight may not be so significant, the accumulation of more than four coats of paint does indeed make it more difficult to inspect aircraft for possible cracks or surface corrosion.⁽⁶⁾

Historically, one of the main corrosion control problems facing the Air Force has been the lack of periodic stripping of aircraft. There are 340 F-111, 644 A-10, and 355 A-7 aircraft in the Air Force inventory--all older aircraft--that have never been stripped. There are over 800 F-15 and 1,300 F-16 aircraft in the inventory--many over 10-years-old. The majority of these aircraft have never been stripped. A more detailed inventory is presented in Table 1.

AFLC has initiated programs to get many of the weapon systems stripped and repainted in conjunction with new periodic depot maintenance (PDM) schedules or other depot modification programs. However, it will take another five years or more to cycle the aircraft through PDM or modification programs. The immediate problem is tackling the backlog of aircraft that have never been stripped. Some of these aircraft will be five years older before they ever get stripped for the first time if they must wait to be cycled into PDM or depot modification programs. Near-term solutions are needed to help AFLC deal with the backlog.

As the need for regional corrosion control facilities is examined, the corrosion control capabilities of the participating commands--TAC, MAC, AFSC, AFRES, and NGB--must be considered. Significant improvement has been made in TAC's corrosion facilities since the 1981 Battelle study. All TAC units now have the capability to perform complete oversprays. However, none have the capability to strip entire aircraft to

bare metal. The other participating commands, to include the reserve forces, have little or no capability to perform complete overspray or strip operations.

Faced with the reality of reduced defense spending and tightened budgets, we must examine alternatives and recommend solutions based on the philosophy of using existing corrosion control capabilities to the maximum extent possible.

CHAPTER II

THE USAF REGIONAL CORROSION CONTROL FACILITIES (RCCF) AT BERGSTROM AFB, TEXAS

Background

The USAF RCCF at Bergstrom AFB, Texas began operations in January 1987. It was unique in that it was a TAC managed depot aircraft strip and paint facility. All other such facilities in the CONUS belonged to AFLC. In 1983, the TAC Commander, General W. L. Creech; the AFLC Commander, General James P. Mullins; and the Director, Air National Guard, Major General John T. Conaway, entered into an agreement that called for TAC to manage programmed regional facilities at Bergstrom AFB TX, Langley AFB VA, and Luke AFB AZ. The NGB would manage the facility programmed for Rickenbacker AFB OH.⁽²⁸⁾ The driving factor for these depot facilities being managed by a command other than AFLC was that other commands could do it cheaper--AFLC must charge 100 percent overhead to operate. The estimated construction costs of the facilities was to be \$5-10 million each.⁽⁷⁾ HQ USAF Logistics and Engineering (LE) PDP S-558 provided construction costs for only the Bergstrom facility and did not include operating costs. Although Delta PDP TT547 was submitted by TAC Deputy Chief of Staff Logistics

(TAC/LG) in February 1986 for operations and maintenance (O&M) funding, the request was disapproved. Consequently, TAC has funded all O&M costs since the facility opened. Monetary constraints have precluded construction of the remaining three programmed regional facilities.⁽⁷⁾

Operation of RCCF

A memorandum of agreement (MOA) between TAC, MAC, AFSC, AFRES, and the NGB governs the administration, support, and operation of the RCCF. It is a one-of-a-kind facility in that it strips and paints 15 different types of aircraft belonging to five different commands. The facility is Air Force owned, TAC sponsored, and contractor operated (approximately 60 contractor personnel) under the operational control of the 67 Tactical Reconnaissance Wing Deputy Commander for Maintenance (TRW/MA). The facility is managed by a government employee, WS-10, facility manager and his staff of 9 military quality assurance evaluators (QAEs) who work for the 67 TRW/MA.⁽⁷⁾

The contract to strip and paint fifteen different types of aircraft--F-15, F-16, F-4, A-10, A-7, F-111, OV-10, F-5, OT-37, T-38, T-33, UH-1, H-3, H-53, and H-60--was difficult to write. The maintenance technical orders governing the requirements of the different aircraft were voluminous. The contract was difficult to bid on by the civilian contractors and equally difficult to award. There were many unknowns and the training required after awarding the contract, by both contractor personnel and military QAEs, was extensive.

Production schedules were developed based on a 100 aircraft per year goal. Each participating command was allocated quotas based on its percentage of the total aircraft listed above. Based on the 100 aircraft goal, TAC was allocated 59 percent, MAC 4 percent, AFSC 6 percent, AFRES 4 percent, and NGB 27 percent.⁽⁹⁾ Each command was given the flexibility of choosing the number and different types of aircraft, provided the overall number did not exceed its annual quota. The TAC/LG staff consolidated the requests for quotas, then worked with the RCCF manager and contractor to develop a schedule to accomplish the production goal. Aircraft were grouped by type in order to facilitate the training of contractor personnel and QAEs. Scheduled input and output dates were developed at the RCCF. The TAC staff then coordinated with the using commands to schedule aircraft into the facility.

Problems

Translating the regional corrosion control facility concept into reality at Bergstrom AFB TX was no easy task. The project was plagued with problems starting with the facility design and extending through the construction phase to the contract award and subsequent operational start-up. While none of the problems were insurmountable, they did enter into the decision to hold plans for the remaining three programmed facilities in abeyance until more could be learned from the operation of the Bergstrom RCCF.

Facility Construction Problems--The construction of the RCCF was a \$5.5 million project managed by the Army Corps of Engineers. The facility was designed by Manufacturing Technology Associates Architectural and Engineering Incorporated in Houston Texas. The project was originally scheduled to be completed by November 1985; the need for 15 engineering change orders extended the estimated completion date (ECD) to 27 February 1986. Numerous other delays, including the failure of the fire suppression system to pass acceptance inspection testing in June 1986, caused the ECD to slip to August 1986. The construction company building the facility had been paying the government \$980 per day in liquidated damages since 28 February 1986. The facility was finally accepted by the Bergstrom AFB Civil Engineers on 11 September 1986--nine months late.⁽¹¹⁾ In the process of the construction delays and the engineering change orders, it was discovered that the facility was designed with inadequate chemical waste treatment capability. The price estimate to fix this design deficiency and build an increased capacity waste treatment facility was \$1.0 million dollars. This problem had the potential of being a "show stopper" since it would preclude all chemical stripping of aircraft.

Waste Treatment Shortfall

Three alternative solutions were examined:

1. Build the increased capacity waste treatment facility at a cost of \$1.0 million.
2. Block off the facility drains and require the strip/paint contractor to remove the contaminated waste effluents. The

government would pay him for this service--originally projected to be approximately \$500 per aircraft.

3. Incorporate a new technology for stripping aircraft in the facility--plastic media blasting (PMB) at an approximate cost of \$1.3 million. This process is similar to sand blasting only that it uses reuseable plastic beads which will not damage the surface. (11)

Alternative two was attractive because it would transfer the problem to the strip/paint contractor. At an added cost of only \$500 per aircraft, 2,000 aircraft could be stripped for the price of the waste treatment facility. This alternative would preclude lengthy delays in opening the facility after its completion. Alternative one would cost \$1.0 million and would take at least six months to construct. During the construction period, the strip/paint contractor could be required to dispose of the contaminated waste. The drawback of alternative one was that this option would lock the RCCF into chemical stripping for years to come. Chemical stripping is costly, time consuming, contributes to air pollution and presents certain health hazards to workers. In addition, the removal of the hazardous waste is costly and is subject to increasingly stringent requirements of the Environmental Protection Agency (EPA) and other regulatory agencies. Figures 1 and 2 depict a F-15 aircraft being chemically stripped--the hazards are clearly visible. The emerging technological advance of plastic media blasting seemed

CHEMICAL STRIPPING OPERATION

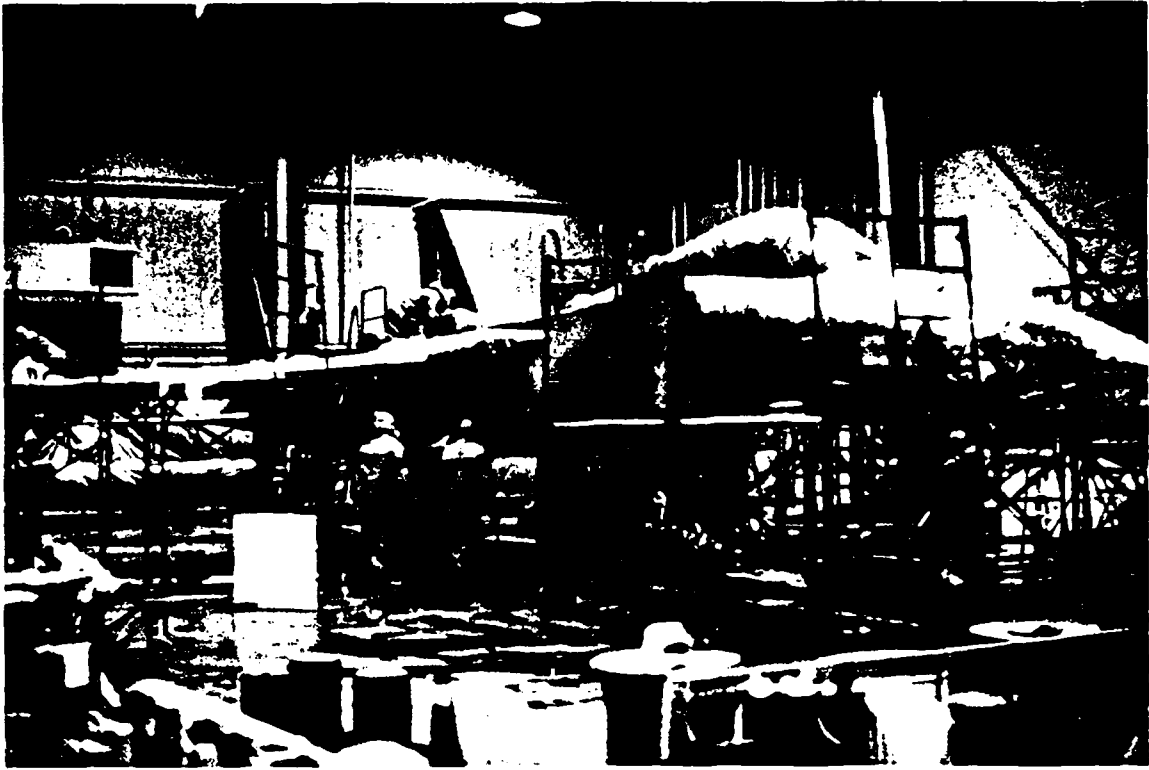


Figure 1



Figure 2

to be the "wave" of the future. It offered some definite advantages over the chemical stripping process. It offered the potential of speeding up the paint removal process while reducing hazardous waste, air pollution and potential health hazards to workers. Figures 3 and 4 depict an F-4G being PMB stripped. There are no messy chemical stripping agents. The emulsified dust collected in the PMB reclaimer system must also be treated as hazardous waste; however, it can be disposed of for one fourth the cost of the chemical strip effluents. It also offered the possibility of increasing the facility production output--possibly doubling it.⁽¹¹⁾

While alternative three, coupled with the requirement to have the contractor dispose of the hazardous waste during the construction period, appeared to offer much potential, the selection of this alternative would require a certain element of risk. There was only one PMB booth in operation at the time, and it was being operated on an on an experimental basis at Ogden Air Logistics Center (ALC), Utah. The process had only been approved for use on F-4 aircraft and selection of this option could result in having a completed PMB booth with no authority to use it on aircraft other than F-4s. Therefore, chemical stripping, and the requirement to have the contractor dispose of the hazardous waste, would have to continue until the various aircraft were approved for PMB stripping and detailed procedures developed. Both alternatives one and three required

PMB STRIPPING OPERATION



Figure 3



Figure 4

additional funds from Air Staff; however, either project could be accomplished under the original RCCF MCP authority with no further congressional approval necessary--the project was still \$1.5 million under the approved limit.

After much discussion between TAC and AFLC, at the general officer level, concerning the probability that plastic media blasting would be approved for all aircraft (with the possible exception of some composite materials) the decision was made to request funds for the inclusion of a PMB booth at the RCCF. In June 1986, TAC was given \$1.33 million of FY84 MCP funds from the Air Staff for the PMB booth. The TAC/LG staff developed the request for proposal (RFP), which included the statement of work (SOW), necessary to go out for competitive bids. The 67 TRW Contracting Office functioned as the contracting agent for this RFP. The PMB booth became operational in April 1988.⁽⁷⁾

The decision to install the plastic media blasting capability in the RCCF appears to have been a correct one, although the approval authority and development of detailed blasting procedures for the various aircraft has been slow coming--over two years since approval for F-4s. To date, the only aircraft approved for plastic media blasting and for which technical data has been developed are the F-4, F-16, A-7. Procedures for most other aircraft are in progress and should be completed within the next year. The use of plastic media blasting has proven to be viable alternative to chemical

stripping from both an environmental and cost standpoint. Actual disposal costs for the contaminated effluents generated by chemical stripping at the RCCF have increased to \$1,600 per aircraft, while the cost of disposing of the hazardous dust generated by the PMB has averaged only \$400 per aircraft. (20:4)

Government Manning Problems--The RCCF was initially set up to be contractor operated and overseen by one WS-09 Facility Manager and four military QAEs (one aircraft general specialist and three corrosion control specialists). The manning was based on a two shift, five day per week operation. The strip/paint contract provided the contractor the option of expanding operations in order to stay on schedule. He exercised that option one week after the contract started. He expanded to a three shift, seven day per week operation in an effort to stay on schedule while training new people. Although the production schedule was intentionally scaled back during the initial two months of operation, the learning curve proved to be steeper than anticipated. The Facility Manager requested and was authorized five additional military QAE personnel (two aircraft general specialists and three corrosion control specialists) to oversee the expanded performance of the contractor. It was absolutely essential that quality of work performed by contractor personnel be validated at each step in the process. Deficiencies in the stripping or corrosion treatment stages would go undetected once the primer coat or top coat was

applied. If not detected, deficiencies could cause premature corrosion and possible peeling of the top coat.⁽¹²⁾

Since the RCCF was government owned and contractor operated, the strip/paint contract specified that it was the responsibility of the government to maintain the building's mechanical systems; i.e., the heating and ventilation systems, the lights, PMB booth and filters for the entire facility. The government would be liable for any period when the contractor was unable to operate due to mechanical failure. The Bergstrom Base Civil Engineers were responsible for maintaining the RCCF facility. When the magnitude of the task and response time of the facility maintenance requirements became known by the base engineers, they said they were unable to support the facility with existing manning. It became necessary to hire four civilian WG-10 temporary overhire mechanical specialists to maintain the facility on an around-the-clock basis, seven days per week. The temporary overhires have been working at the facility since it began operations in January 1987. The four mechanical specialists have proven to be essential to the continued operation of the facility.⁽¹³⁾ Currently, the TAC Logistics, Engineering and Manpower staffs are working on converting the temporary overhire slots to permanent positions with a goal of having the positions authorized by the end of FY90.⁽¹⁴⁾

Contractor Performance Problems--The 67 Tactical Reconnaissance Wing Commander at Bergstrom, Colonel Charles E. Loflin,

expressed his concern for the RCCF contractor's performance to the TAC Commander, General Russ, in a 22 April 1988 letter.

Colonel Loflin Stated:

"The Regional Corrosion Control Facility contractor is one of my areas of concern. While his quality and production rates have improved, we are having to work hard to bring him around to meet safety and environmental standards. I directed a detailed analysis of his section be completed, and the results are now being developed into a cure notice. Your staff has been kept informed of the situation and has visited the facility recently to review our concerns firsthand. I will also discuss the matter with General Viccellio (TAC/LG) during his visit to Bergstrom next week." (15)

A functional management survey of the RCCF contractor's training and safety programs was conducted by a team of Wing experts in maintenance quality assurance and safety in March 1988 at the direction of the Wing Commander. The overall contractor operation of the RCCF was rated unsatisfactory. An extract from the survey report executive summary stated:

"The programs to make this facility run safely and efficiently are available and already incorporated into the contract. If the contractor would follow those programs, his training, safety and hazardous waste program would be strong and viable. It was the consensus of the survey team that a production oriented management philosophy has de-emphasized the housekeeping, safety, formal training, and hazardous waste programs. A majority of the deficiencies and discrepancies noted in this report have been identified in previous reports to contracting or safety. Steps taken by the contractor have been inadequate and have failed to ensure lasting corrective action on identified deficiencies." (16)

This survey convinced the contractor that adherence to prescribed safety, training, and hazardous waste management programs was coequal with aircraft production. Contractor performance has improved greatly since this study was accomplished.

While units that have had aircraft stripped and painted at the RCCF have been generally satisfied with the quality of work performed, there has been some concern about the contractor not meeting scheduled output dates. This has created scheduling problems for the units. In some instances, they may have already dispatched a pilot to the RCCF to pick up aircraft--only to find it not ready. Contractor delays could play havoc with the home unit weekly flying/maintenance schedule which may have already been printed with flying or maintenance scheduled for that aircraft. Production overruns have largely been a result of contractor personnel being required to reaccomplish work during the various steps of strip/paint production process. The military QAEs strictly enforce technical order standards of excellence, thus assuring the quality of the end product. Although the RCCF occasionally received complaints from units when the aircraft returned, the complaints were normally a result of not knowing what work was to be accomplished according to the contract. The QAEs are the RCCF's "check and balance" on the production process.

The original strip/paint contract was written to encourage the contractor to produce as many aircraft as he was capable of producing. He was being paid by the aircraft, and only after it was completed. After a short period of time, it became apparent that the contract did not offer sufficient incentives to meet the scheduled aircraft output dates. Or said

another way, there were no penalties for failure to produce the aircraft on time. The fact that the contractor would only be paid when the aircraft was completed was not an adequate penalty.

In January 1988, the contract was amended, at the government's request, to provide more incentive to the contractor to produce aircraft on time. The contractor would earn \$500 per day for every day the aircraft was produced ahead of the scheduled output date. Conversely, he would pay \$500 per day for every day he was late. The contractor saw this as an opportunity to earn additional money; therefore, he concurred with the amendment. As a result of this contract change, the contractor's production performance improved dramatically.⁽⁷⁾ Since that time, the contractor has approximately broken even between incentives and penalties.⁽¹⁷⁾ The RCCF has steadily gained credibility with supported units by producing a quality product while sticking close to scheduled output dates.

Operational Funding Problems--The original MOA between the participating commands stated that TAC would request funds from Air Staff to operate the facility through the POM process. If unsuccessful in securing funds, "each utilizing command will reimburse TAC for the cost of labor and materials used for each aircraft." Although funds to operate the RCCF have been requested, no Air Staff funds have been received. TAC funded the entire operation the first year with no reimbursement. AFRES and the NGB began reimbursing TAC in the second and

third year of operation. AFSC was not able to secure the funds to reimburse TAC until the third year of operation. TAC has funded all MAC aircraft stripped and painted at the facility for the first three years. MAC will begin reimbursing TAC in FY91. A new MOA is in coordination now that will require participating commands to provide funds to the RCCF prior to aircraft arrival. Funds will cover contract costs, cost of supplies, and the cost of hazardous waste disposal. (18:5)

RCCF Production

The RCCF differs from base corrosion control facilities by having the capability of completely stripping the aircraft down to bare metal. Base corrosion control shops can only scuff sand the outer coat before applying a new primer and top coat. The finished product looks comparable to that of an RCCF paint job; however, stripping the aircraft down to bare metal offers some significant advantages. In TAC alone, there are 577 F-15 and F-16 aircraft over 6-years-old that have never returned to depot facilities to be stripped in conjunction with either periodic depot maintenance or modification programs. This means that these aircraft may have 240-360 pounds of extra weight attributable to accumulated paint coatings. Of the 577 aircraft over 6-years-old, 354 are between 10 and 12-years-old. These aircraft also have never been stripped which means that some aircraft may have 400-600 pounds of extra weight attributable to paint buildup. Reports have been received from depots stating

that they have removed as many as 18 coats of paint from certain aircraft--720-1,080 pounds of extra weight.

While the added weight caused by the paint buildup may not be significant in terms of causing an aircraft to exceed its maximum gross takeoff weight or altering its center of gravity (since the added weight is distributed evenly), it may create extra drag or result in extra fuel consumption.⁽⁶⁾

In addition to removing excess weight, stripping aircraft to bare metal offers other substantial benefits. It allows corrosion experts to perform in-depth inspections of the entire aircraft for cracks and surface corrosion that may have otherwise gone undetected. It also enables the corrosion experts to apply corrosion inhibitors over the entire bare surface prior to applying the primer and top coat. Aircraft that are based near salt water, or fly at low altitudes over the ocean, are more susceptible to corrosion. Such aircraft would benefit the most from the more in-depth corrosion inspection made possible by stripping to bare metal.

The RCCF at Bergstrom is the only TAC facility that offers the capability of stripping aircraft. While each of the aircraft depots at the various Air Logistic Centers, has the capability to strip aircraft, they do not possess the capability of handling the backlog in the near term.

In the three years that the RCCF has been in operation, it has produced 337 aircraft at an average cost of \$24,367 per aircraft (Table 3). The average cost for stripping and painting

at depot facilities is considerably higher (Table 2). The RCCF has provided TAC the additional capability to handle special TAC and inter-command projects. For example, the F-4 fleet converted from a green camouflage paint scheme to a semigloss gray polyurethane scheme in 1988. This conversion created a major problem for F-4 units. The semigloss gray polyurethane paint could not be applied over the green lacquer-based camouflage paint--it would not adhere.^(18:2) The lacquer based paint had to be completely stripped down to bare metal before the primer coat and gray semigloss top coat could be applied. The only facility in TAC that had the capability to strip aircraft was the RCCF. F-4 units had the option of converting to the new paint scheme over an extended period of time as the aircraft went through periodic depot maintenance (PDM). However, this would have extended the conversion over a five-year period--considered too long. Field units attempted to sand the aircraft down to bare metal using mechanical sanders; however, this proved to be a fruitless effort. It increased the normal time of scuff-sanding six-fold. The problem was elevated to the TAC/LG. After looking at many alternatives, the decision was made to use the newly installed PMB booth at the RCCF to strip the aircraft. They were then corrosion treated, primed and returned to home station for application of the top coat and markings.⁽¹⁹⁾ In less than two years, the RCCF has stripped 138 F-4 aircraft while continuing to chemically strip and paint

other types of aircraft not yet approved for plastic media blasting. (20:2)

In November 1988, TAC began drawing down its OT-37 aircraft. The conversion plan called for transferring 29 OT-37s from Patrick AFB, Florida to ATC after a modification program which would return them to standard T-37 aircraft configuration. The OT-37 aircraft were painted a green camouflage paint scheme. ATC requested that the aircraft be repainted to the standard white ATC T-37 paint scheme. The problem facing the TAC units transferring the aircraft was that the gloss white polyurethane paint could not be applied over the green camouflage paint--the green would bleed through. Alternative solutions for converting to the white paint scheme were studied. The TAC/LG chose to use the RCCF as the least cost alternative. The 29 aircraft were stripped and in-depth corrosion inspections revealed significant corrosion on the flight control surfaces of most aircraft. A special depot team was sent to the RCCF to correct the extensive problems. (14) When completed, the 29 aircraft were transferred--ATC was extremely happy with the condition of the aircraft they received.

In 1987, two OV-10s being transferred from TAC to Alaskan Air Command (AAC) were sent to the RCCF to be stripped and painted prior to transfer. The aircraft were being converted from a green camouflage to a gray polyurethane scheme. Once stripped, severe corrosion was detected over the entire

bodies of both aircraft. This discovery resulted in a depot refurbishment program for all OV-10 aircraft--fleetwide--called "Pacer Bronco." (14)

In two other cases, the RCCF identified the camera bay door on the RF-4 and the canopy sills on the F-5 as corrosion prone areas requiring special attention by base personnel during phase inspections. (14)

The current FY90 RCCF schedule is being governed largely by critical funding of the various commands. TAC will convert the remaining 20 F-4 aircraft to the semigloss gray paint scheme and will strip and paint 30 F-15 and 30 F-16 aircraft. Five H-1 and five H-3 MAC helicopters will be stripped and painted. The remaining slots will be allocated to AFSC, AFRES, and the NGB based on their availability to pay. (14) The present strip/paint contract expires at the end of FY90. A new RFP has been prepared and will be out for bid soon. The new contract will most likely be restricted to small businesses again and will begin operations in FY91.

Assessment of RCCF

The concept of establishing USAF regional corrosion control facilities was unique in a number of ways. It was the first depot level strip/paint facility to be managed by a command other than AFLC and be shared by five different MAJCOMs. It was also the only facility of its kind to strip, corrosion treat, and repaint 15 different types of aircraft and helicopters not having periodic depot maintenance or

modification schedules. Problems were encountered every step of the way. The RCCF design proved to be less than optimal. Numerous change orders and problems encountered resulted in a nine month delay in completing the facility. The development of the statement of work (SOW), covering 15 different types of aircraft and helicopters, and subsequent RFP was a tough task for the TAC/LG staff who had never developed a SOW or RFP before. The fact that the contract was restricted to small businesses ensured that bidders did not have a wealth of experience at painting aircraft. The lack of waste treatment capability built into the RCCF gave the staff the opportunity to explore new technology for stripping aircraft. Incorporating the new plastic media blasting capability into the facility, required securing the necessary funding from Air Staff and developing another SOW and RFP which went out for competitive bid. AFLC has since built PMBs at each of its Air Logistics Centers managing fighter aircraft.

The organization structure of the RCCF was unusual. The facility was under the operational control of the 67th TRW/MA and managed by a government civilian employee, WS-10, facility manager and his staff with the TAC/LG staff providing all funding support, developing necessary RFPs and coordinating with the participating commands and TAC units to allocate slots in accordance with the facility manager's desired schedule.

The learning curve was steep for all involved in the RCCF project. Great flexibility in dealing with problems was

required and demonstrated on a continuous basis. The checks and balances provided in the process by the military QAEs proved to be essential and have insured the production of a quality product by the contractor. By the midway point in the second year of operation, the majority of the "bugs" had been worked out of the facility operation. The contractor has been extremely flexible in responding to the government's needs in making schedule adjustments to handle the many special projects. In spite of all the turmoil throughout the various phases of the RCCF construction and operation, the RCCF has produced a quality product.

Potential for Increased Production--The RCCF is capable of increasing production with the increased use of the PMB booth vice chemical stripping--provided the rest of the weapon system System Program Managers (SPMs) authorize the use of plastic media stripping on their aircraft and develop the necessary procedures for its use. Given adequate funding and adjustments in the contractor's work force, the PMB could be operated around-the-clock, seven days a week, to tackle the huge backlog of aircraft requiring stripping. The aircraft could then be corrosion treated and returned to home station for the application of the top coat and markings. Once all aircraft serviced at the RCCF are approved for plastic media blasting, chemical stripping could be discontinued completely and possibly a second PMB could be installed in the remaining chemical strip bay. Another possibility may be to construct additional PMB

booths as stand-alone facilities, adjacent to the existing RCCF building. The construction of additional PMB booths at Bergstrom would enable existing managers and staff to increase facility production with little or no increase in the supervisory staff--only additional workers would be required.

The Potential for Problems With New Contract--The award of the new contract for the operation of the RCCF in FY91 could bring some changes. The prices for stripping and painting the various aircraft could increase--possibly significantly--no matter who the contract is awarded to. The present contractor is in a better position to bid more intelligently now than he was four years ago. Plus, he is fully aware of how much cheaper the RCCF prices are than those at the depots. Should he desire to bid on the new contract, and he could be the low bidder, some benefit may be derived. It would seem that continuing with a known quantity may preclude having to go through another learning curve with a new contractor. Even if a new contractor is awarded the contract, the lessons learned by the facility manager and his staff should greatly aide the contractor and help speed up the learning process. No matter who is awarded the new contract, the facility manager and his staff will be in a much better position than four years earlier. The biggest danger of a new contract is the potential for drastic price increases. If the increases are too large, the government may elect not to award the contract and go out for bid with a new

RFP. This is a lengthy process which could leave the facility with no production for an extended period of time. Another danger that exists is that the low bidder may be low because of his limited knowledge of what the contract really entails--something that may cause him to go put himself out of business in a short period of time.

The flexibility of the present contractor in accommodating government special projects and schedule changes has been one of his strong points. The next contractor may not be so flexible and it may take two more years to get the quality of his product up to standard.

CHAPTER III

ANALYSIS OF NEEDS VERSUS CAPABILITY

Table 1 depicts the inventory of fighter-sized aircraft and helicopters for TAC, MAC, NGB, AFRES, and AFSC--the users of the RCCF at Bergstrom AFB TX. The difference between the total AF inventory (Column F) and the total inventory of the RCCF users (sum of Columns A-E) represents those aircraft outside the CONUS serviced by overseas depot or contract facilities. (2:1-5) The exception is the T-38s which are in ATC. While the RCCF at Bergstrom was setup originally to handle only aircraft that did not have periodic depot maintenance schedules or other depot modification programs, the role was expanded to accommodate special projects that could not be supported by AFLC; i.e., the conversion of the F-4 paint scheme to semi-gloss gray and the conversion of the OT-37 paint scheme to the T-37 scheme for those aircraft being transferred to ATC.

Programs to strip and paint H-1 and H-3 helicopters are already in being. H-1s are being done at Corpus Christi Army Depot. H-3s are being done at the Pensacola Naval Rework Facility. There is no longer a need to strip and paint any helicopters at the RCCF. (21)

As a result of the severe corrosion found on two OV-10s stripped at the RCCF (the only two stripped there), AFLC initiated the "Pacer Bronco" depot refurbishment program for all OV-10s.^(18:3) Therefore, there is no longer a need for additional OV-10s to be stripped and painted at the RCCF.

All TAC OA-37s are located in Panama and are being scuff sanded and painted by base personnel. Various areas are being chemically stripped as needed to inspect for corrosion. Since there are no EPA restrictions on chemically stripping aircraft in Panama, there is no need to strip and paint OA-37s at the RCCF or depot facility.⁽³⁰⁾ The NGB does have a need to have their OA-37s stripped and painted.⁽²⁹⁾

All TAC T-38s are located at Holloman AFB NM. The remainder belong to ATC. While ATC continues to chemically strip T-38s at its bases where the Environmental Protection Agency (EPA) hasn't specifically banned chemical stripping, they are scuff sanding and painting T-38s at other locations. ATC is in the process of finalizing procedures for plastic media blasting its T-38s.⁽²²⁾

A PMB booth has already been installed by ATC at Randolph AFB TX and booths are programmed for Vance and Williams AFBs. At Holloman AFB NM, TAC T-38s are currently being scuff sanded and painted. There had been some earlier chemical stripping and painting by contractor personnel, but this has been terminated due to a ban by the EPA. The need for stripping Holloman's T-38 aircraft is not immediate. The paint buildup on

its aircraft is not considered to be significant.⁽²³⁾ In the future, there may be a need to strip TAC T-38s, but now, there is no requirement to cycle TAC T-38s through the RCCF.

All 355 A-7 aircraft are in the NGB and are in need of stripping and painting, with the exception of the 23 already done at the RCCF.^(20:2) In response to this need, the A-7 System Program Management (SPM) office has already started stripping and painting A-7s at the Sacramento Air Logistics Center and has contracted for some others to be done by Ling Temco Vought (LTV). They are currently preparing a RFP to have 300 A-7s stripped and painted over a 3-6 year period.⁽²⁴⁾ There should be no need to send A-7s to the RCCF.

The A-10s go through PDM at the Sacramento ALC; however, chemical stripping has never been done due to the potential for having trapped chemical stripping agent left in the aircraft after stripping. The depot only scuff sands and paints aircraft at PDM. They are currently developing procedures for plastic media blasting on the A-10s. Once bead blasting is approved for A-10s, the SPM may try to award a contract to get some quantity stripped and repainted annually. The criticality for stripping A-10s is not as immediate as it is for the A-7--also managed at the Sacramento Air Logistics Center.⁽²⁴⁾ While there may be some need to strip and paint some A-10s at the RCCF once plastic media blasting is approved and procedures developed, the need to cycle A-10s through the RCCF should not be significant once the SPM strip/paint contract begins.

The F-111s have never been chemically stripped at the Sacramento depot because of the nature of some of the surfaces. Because of current funding, no stripping and painting is being accomplished at the depot. All work is being accomplished at home station. Based on the SPM corrosion monitor's stated requirement that the F-111 wings would have to be removed prior to blasting with plastic media due to possible media intrusion problems, it is not anticipated that any F-111s would be done at the RCCF.

The F-4/RF-4 aircraft have been stripped and painted at the Ogden Air Logistics Center for some time. The RCCF has already stripped 142 aircraft in an effort to speed up the paint conversion program and will complete the last 20 programmed by in FY90. There will be no future need to strip and paint F-4/RF-4 aircraft at the RCCF.⁽²⁵⁾

There are 645 F-15s and 988 F-16s in the CONUS. Of these, 577--35 percent--are over 6-years-old and have never been stripped. Twenty-two percent--354--are 10-12-years-old and have never been stripped. There is no PDM for F-15s; however, a major modification program began in 1988 at the Warner Robins Air Logistics Center. In conjunction with this modification, aircraft are being stripped and painted. TAC has received 72 of these modified aircraft thus far. The only F-16s presently being stripped and painted at the Ogden Air Logistics Center are the F-16A/B models undergoing the conversion to the Air Defense Fighter (ADF) configuration. All 250 of these are going to the

NGB. Even if the depot continues to strip and paint F-16 aircraft beyond the (ADF) conversion, the backlog of older F-16s requiring stripping is significant--beyond the depot's current capability. (26)

The need to strip and paint the current backlog of older F-15 and F-16 aircraft from TAC, NGB, AFRES, and AFSC greatly exceeds the RCCF's capability unless the facility production is devoted strictly to F-15 and F-16 aircraft over the next few years.

Warner Robins Air Logistics Center is building a new PMB booth for stripping F-15s in anticipation of converting to plastic media stripping, however, there have been significant delays in developing F-15 aircraft technical orders and procedures for plastic media blast stripping. Until these procedures are developed, the RCCF must continue chemical stripping F-15s. Any effort to increase F-15 production at the RCCF must rely on plastic media stripping vice the time consuming chemical stripping. The need to speed up the conversion to PMB stripping for F-15 aircraft is compounded by the facts that the EPA has been steadily tightening restrictions on chemical stripping operations and the costs of hazardous waste removal continually rises. The current cost of hazardous waste removal at the RCCF is now up to \$1,600 per aircraft. (20:4)

While the NGB, AFRES, and AFSC have very limited paint capability at unit level, TAC has complete overspray capability

at each of its bases.⁽²⁷⁾ Thus, TAC's main need for its older F-15 and F-16 aircraft is to strip the multiple layers of paint to facilitate structural integrity and corrosion control inspections and treatment. In order to increase production at the RCCF, TAC aircraft could be PMB stripped (assuming approval authority is given on Warner Robins ALC and procedures are developed), treated with alodine, and returned to home station for priming and top coating. This would save valuable production time at the RCCF and allow more aircraft to be stripped and painted. Due to the limited paint capability at the NGB, AFRES, and AFSC units, their aircraft would continue to be stripped and painted at the RCCF.

CHAPTER IV

ANALYSIS OF ALTERNATIVES

USAF RCCF at Bergstrom AFB

Given the need to strip and paint CONUS based aircraft listed in Table 1, there can be no doubt that continued production of the RCCF at Bergstrom can augment AFLC depot capability and help reduce the backlog of aircraft requiring to be stripped. The manner in which the RCCF is managed can greatly impact its effectiveness at reducing the backlog; i.e., the scheduled hours of operation, the type and distribution of aircraft to be scheduled, the order in which they are scheduled, the method in which they are stripped, and the services to be performed on each aircraft.

Hours of Operation--Presently, the RCCF is operated on a two shift, six day a week basis. Only F-4 and F-16 aircraft are stripped using the PMB; all others are chemically stripped. The PMB is only in operation a small portion of the available time. Production at the facility could be expanded by extending operations to a third shift. With a push from the AFLC Commander, the "foot-dragging" taking place concerning the approval to use plastic media blasting on the various aircraft and the development of procedures could be greatly accelerated.

Once the use of the PMB is approved for all aircraft, the booth could be operated three shifts per day, seven days per week.

Type and Distribution of Aircraft Scheduled--With the exception of the special project aircraft stripped and painted at the RCCF, production has been spread over 10 different types of aircraft from the five participating commands according to the ratio TAC 59 percent, MAC 4 percent, AFSC 6 percent, AFRES 4 percent and NGB 27 percent. This distribution of production has precluded making a dent in the overall requirements of any of the commands. Each of the special projects has been handled in an excellent manner--with project goals achieved.

In order to maximize the production capability of the RCCF, facility production should be grouped by strings of a particular type of aircraft, i.e., 15 F-15s then 10 F-16s, etc. Although schedulers have tried to do this, they have not always been successful. Consequently, contractor personnel often have to relearn the peculiarities of the various aircraft. The schedulers should attempt to allocate commands the appropriate percentage of production slots, then schedule the aircraft into the facility by weapon system. Since helicopters can be done at other facilities specializing in helicopters, they could be eliminated--the facility would then service only four commands since MAC could be eliminated.

Method of Stripping--There are two alternatives available for stripping aircraft at the RCCF--chemical stripping and plastic

media blast stripping. Since only the F-4 and F-16 aircraft are approved for PMB use and have procedures developed, the RCCF is currently forced to use chemical stripping on everything else. The PMB offers significant advantages. It can be accomplished faster, cheaper, and it eliminates the environmental hazards associated with chemical stripping and reduces the cost of hazardous waste disposal.

Facility Alternations at the RCCF--Figure 5 depicts the RCCF facility layout. There is one bay for chemical stripping and one bay with the PMB. The area between the two bays is used for preparation, depreparation and marking. Once the facility switches to PMB stripping only, the chemical strip bay could possibly be converted to a second PMB facility. The installation of another PMB would cost \$1.0-1.5 million. The RFP used to procure the first booth could be updated and reused with little change. The second PMB could be completed as early as in one year from time the RFP is put out for competitive bid. However, the project would most likely experience the normal delays associated with MCPs.

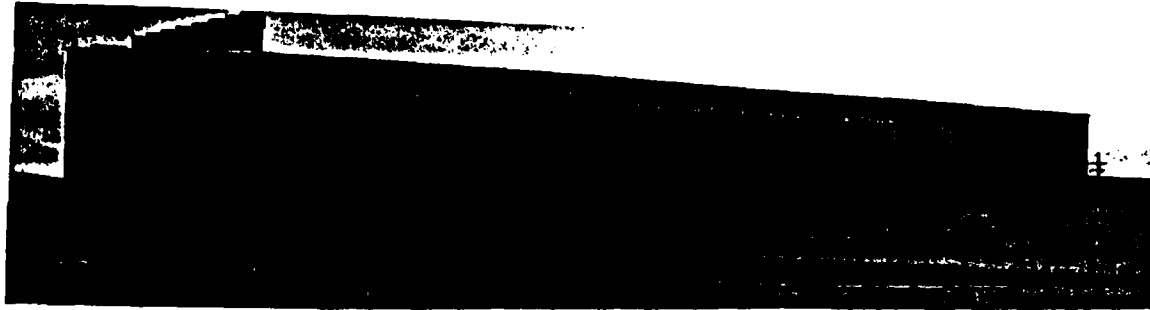
Another alternative would be to construct one or more additional PMBs outside the current RCCF building. This would preclude the RCCF losing aircraft maneuvering room and working area within the existing facility. The additional PMBs could be managed by the existing RCCF Facility Manager and his staff. The contractor's supervisory staff could most likely operate the

additional PMBs by just expanding his basic workforce, thus saving on overhead. Again, this would have to be done as a MCP and would be subject to delays.

Should the Remaining Three Programmed RCCFs at Langley AFB VA, Luke AFB AZ, and Rickenbacker ANGB OH be Constructed?

The NGB and AFRES have a combined total of 1,634 fighter aircraft (NGB 1,351 and AFRES 283). There is a definite need for one facility, capable of stripping and painting 150 aircraft per year, dedicated strictly to the reserve forces. The location does not need to be at Rickenbacker ANGB. If a decision was made today to build an RCCF to support the NGB and AFRES, the requirement would have to enter the POM process and be approved and funded as a major construction project. Since the NGB has the larger number of aircraft, it would be logical for the NGB to be the host for the facility. If the project had adequate backing and support from NGB, the earliest it could possibly become operational is in five years. As an interim measure, this option could be complemented by awarding a contract to strip and paint aircraft to a civilian company using the contractor's facility. It would take at least one year, if everything went smoothly, to award such a contract and begin operations.

After reviewing the problems experienced by TAC in establishing and operating the RCCF at Bergstrom AFB, (Chapter II), establishing another government owned and contractor



USAF REGIONAL CORROSION CONTROL FACILITY LAYOUT
BERGSTROM AFB, TEXAS

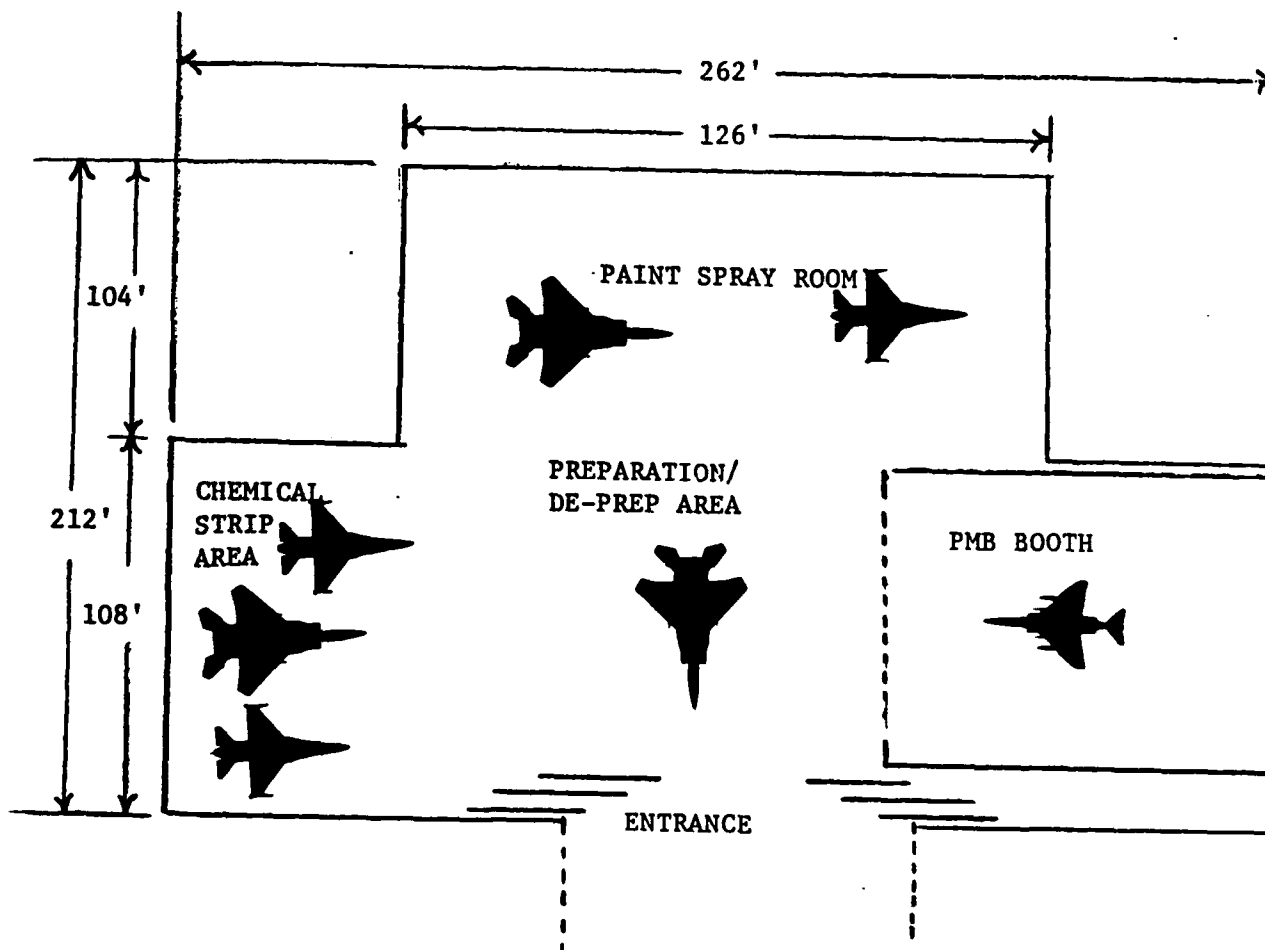


Figure 5

NOTE: DIAGRAM NOT TO SCALE

operated RCCF may not be the ideal way to go. A better option may be to contract out the entire operation to a civilian contractor, using his facility. The price charged per aircraft may be higher than that currently being charged at the Bergstrom RCCF, but it most likely would be less than that charged by AFLC. Table 2 depicts current costs per type of aircraft at the RCCF and ALCs.

Langley AFB VA RCCF--Whether there is a need for an east coast facility or not, Langley AFB would be the wrong location. The base at Langley is cramped for space, has a two foot elevation above sea level, which would result in double the construction costs due to the requirement for pylons, and the base is too busy already with NASA, HQ TAC, First Air Force, the 1st Tactical Fighter Wing, and the 48th Fighter Interceptor Squadron.

If an east cost location is desired, a better location might be Seymour Johnson AFB NC. Establishing a RCCF at Seymour Johnson AFB would also take at least five years to become operational because of the POM process. It too would be subject to the same problems experienced at the Bergstrom RCCF. A recommended layout for future RCCFs is shown in Figure 6. Another option would be a contractor owned and operated RCCF somewhere in the southeast. With the existing facility at Bergstrom and expanded use of the PMB to solve the immediate problem of stripping the backlog of aircraft, a RCCF on the east coast is not needed to strip and paint aircraft. A lower cost

PROPOSED LAYOUT FOR FUTURE RCCFs

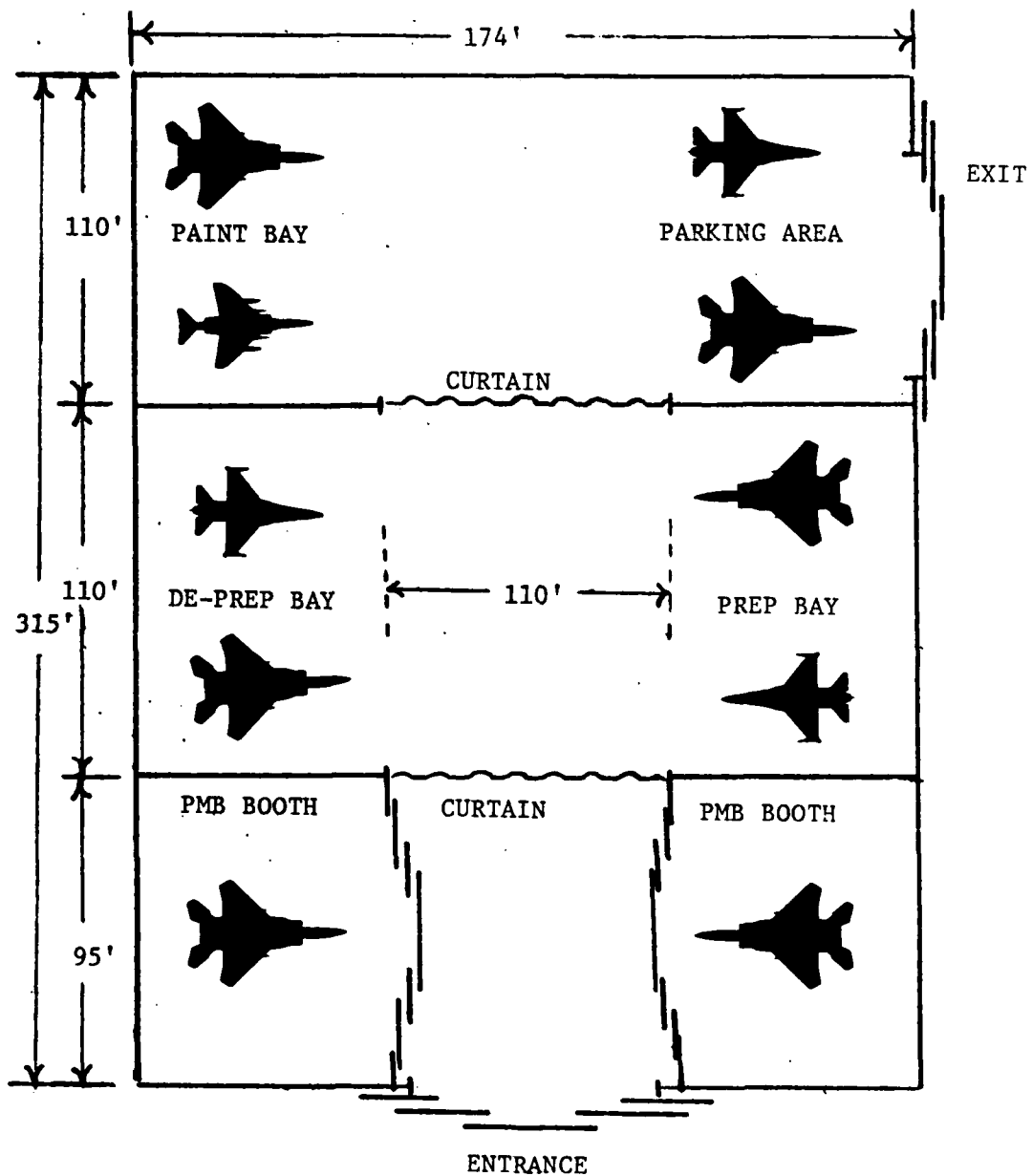


Figure 6

NOTE: DIAGRAM NOT TO SCALE.

option would be an east coast contractor owned and operated strip only facility. This facility would respond to the needs of TAC only. AFSC requirements could be handled entirely at the Bergstrom RCCF which would continue to strip and paint aircraft. Having an east coast location is not critical, since all east coast TAC bases can easily fly their aircraft to Bergstrom AFB.

Luke AFB AZ RCCF--Establishing an RCCF at Luke AFB would be subject to the same delays mentioned above and would be subject to the same type of problems experienced at the Bergstrom RCCF. Luke AFB does offer the best location of the three under consideration. Luke AFB already has one wing of older F-15 aircraft and another of older F-16 aircraft. Also, it is in close proximity to other TAC bases, Nellis AFB NV, Cannon AFB NM, Holloman AFB NM, Mountain Home AFB ID, Hill AFB UT, and Davis Monthan AFB AZ. The warm weather climate in Arizona offers an advantage of reduced heating costs. The dry climate will dictate the need for a humidifier; however, the cost of running the humidifier is far cheaper than trying to heat a facility in a colder climate. Construction of an RCCF at Luke AFB will not satisfy the immediate need that currently exists; however, it could help accommodate long-term requirements. Force structure changes anticipated during the next two years may drive the requirements for a facility in the southwest even higher. SAC will be transferring its FB-111s to TAC, and the entire F-111 fleet may be changing paint schemes from a green

camouflage lacquer-based paint to a dark "nightfighter gray" lacquer-based paint. Since both paints are lacquer-based and the gray is dark, the gray paint should cover and adhere with only scuff sanding required. The aircraft should not need to be stripped. A regional facility or contractor owned and operated facility in the southwest may be needed to help accelerate the F-111 paint conversion program. Without additional help, the conversion may take up to four years to complete.

Contractor Owned and Operated Facilities--There are many advantages that can be gained by using contractor owned and operated facilities. The insight gained by the operation at the Bergstrom RCCF could be most helpful in developing a good SOW and RFP. The expected price per aircraft would probably be somewhere between the depot charges and the RCCF charges (Table 2). A contract to use a contractor owned and operated facility could be awarded and put in operation within one year. This would be more responsive to the immediate needs. A drawback of such an operation would be less flexibility than the government now enjoys at the Bergstrom RCCF; however, some degree of flexibility could be written into the contract. The preparation of such a contract would require much expertise. Involvement of the Bergstrom RCCF personnel would be extremely helpful. One of the major drawbacks of writing such a contract is the lack of expertise which the writer normally possesses. If augmented by the continued operation of the Bergstrom RCCF plus one new

contractor owned and operated facility, AFLC may be caught up with the current backlog in five years.

ALC Depot Facilities--Depot ALC operations could easily be expanded; however, the costs of depot paint jobs are significantly higher than the prices at the Bergstrom RCCF or those charged by separate contractors. Depot ALCs may be able to expand production capability in less than one year, barring major construction additions.

System Program Manager (SPM) Contracts to Augment Depot

Capability--Faced with significant backlogs, such as with A-7s and A-10s that have never been stripped, the SPM can issue a RFP to have a certain number of aircraft stripped and painted annually over a specified period of time at a contractor owned and operated facility. This would only be done if the requirement clearly exceeds the depot production capability.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

The USAF Regional Corrosion Control Facility (RCCF) at Bergstrom AFB TX has been in operation for three years. It has produced 337 aircraft during that period. While the RCCF has not significantly reduced the backlog of aircraft requiring stripping and painting, it has enabled TAC to cope with special programs such as the F-4 paint scheme conversion and the repainting of 29 OT-37s transferred to ATC as T-37s. Because of the existing backlog of aircraft to be stripped for the first time, the need for additional facilities to augment depot strip/paint capability will last at least five more years. The Bergstrom RCCF should continue operations at an increased level of productivity. The three remaining RCCFs programmed, but unfunded, should not be built. An alternate course should be taken to decrease the current backlog facing AFLC. Specific recommendations are:

1. Expand the Bergstrom RCCF production capability by going to a three shift, six or seven day per week operation.
2. Schedule aircraft into the RCCF to maximize the use of the PMB. TAC aircraft should only be stripped and corrosion treated, then returned to home station for top coating.

Aircraft from the NGB, AFRES, and AFSC should continue to be stripped, corrosion treated and painted.

3. Schedule a meeting between the TAC/LG and the AFLC Deputy Chief of Staff Material Management and the Commander, Logistics Operations Center (AFLC/LOC) to advocate applying pressure to the system program managers that have not yet authorized the use of plastic media stripping on aircraft under their management. Technical orders and procedures should then be developed as soon as possible in order that all chemical stripping can be discontinued.

4. Concentrate the production at the RCCF on the aircraft with the largest backlog; i.e., F-15 and F-16 aircraft. Prioritize aircraft being input into the RCCF based on such factors as the severity of the corrosive environment from which they come, the length of time since the last full strip, the number of layered top coats and evidence of structural integrity problems, surface cracks or corrosion. As the large backlog of aircraft is being worked, establish emergency procedures for early inputs of aircraft detected to have major structural or corrosion problems that require complete stripping to assess the full extent of the problem.

5. Eliminate the painting of helicopters at the RCCF. Calculate the proportionate share of slots for each command. Using Table 1 as a basis for calculation, the input allocation would be TAC 53 percent, NGB 37 percent, AFRES 8 percent, and AFSC 2 percent.

6. Continue to use the RCCF for special projects as required. The RCCF has done much in the past to satisfy peculiar needs that could not be supported elsewhere.

7. Abandon the government owned, contractor operated RCCF concept which is based on use by geographical location. Establish a joint use NGB and AFRES contractor owned and operated facility at a location to be determined by the NGB and AFRES. Establish a second such facility in the southwest to be used by TAC. Depending on the extent of expansion at the Bergstrom RCCF; i.e., the number of PMBs added, the southwest contract facility could possibly be closed after backlog has been eliminated.

8. Increase the prices charged to the other commands for aircraft stripped and painted at the RCCF. Table 2 shows the total price per aircraft based on contractor charges plus overhead. The new memorandum of agreement should be changed to reflect a 38 percent overhead rate as a function of the total price (based on actual RCCF cost data from FY87-FY89, Table 3).

9. Challenge the prices charged by Depots to strip and paint aircraft. They are extremely high--and not affordable even though the capability exists.

10. Ensure that AFLC goes out on contract as planned to get A-7s and A-10s stripped since this backlog of 355 A-7s and 481 A-10s could not be handled at the RCCF or existing depot facilities.

11. Encourage system program managers to seek contractor owned and operated facilities to augment depot capability.

APPENDIX A

Table 1

Fighter Aircraft/Helicopters Inventory

	<u>A</u> <u>TAC</u>	<u>B</u> <u>MAC</u>	<u>C</u> <u>NGB</u>	<u>D</u> <u>AFRES</u>	<u>E</u> <u>AFSC</u>	<u>F</u> <u>Total</u> <u>AF</u>
F-15	513		113	0	19	872
F-16	547		296	111	34	1,370
F-111	144		0	0	6	340
A-10	282		100	97	2	644
F-4/RF-4	232		434	75	30	1,125
A-7	0		355	0	0	355
OV-10	76		0	0	0	76
OA-37	21		53	0	0	74
T-38	126		0	0	0	859
H-1	3	87	0	5	3	98
H-3	0	32	9	17	3	61

Notes:

1. All H-1 helicopters stripped and painted at Corpus Christi Army Depot and H-3s stripped and painted at Pensacola Naval Facility. No future need to strip and paint H-1s or H-3s at RCCF.

2. Aircraft inventory data provided by TAC/LGM Fighter/Recon/Combat Support Divisions based on information extracted from the Worldwide Weapon System Inventory Listing.

(As of 19 December 1989)

APPENDIX B

Table 2

Cost Comparison, Bergstrom RCCF vs Depot

<u>Bergstrom RCCF</u>			<u>Depot</u>		
<u>Aircraft</u>	<u>Contractor Charges (Chem Strip)</u>	<u>Total Cost Cont + O/H (Chem Strip)</u>	<u>Contractor Charges (PMB Strip)</u>	<u>Total Cost (Cont + O/H (PMB Strip)</u>	<u>Depot</u>
A-7	\$18,000	\$24,899	\$14,000	\$19,366	\$65,000 \$30,250*
A-10	22,500	31,123	19,000	26,282	74,500 40,540*
F-15	26,000	25,965	19,500	26,973	59,000
F-16	12,500	17,291	9,500	13,141	38,500**
F-4	21,500	29,740	17,500	24,207	30,500**
F-5	12,000	16,599	9,000	12,449	N/A
T-38	10,500	14,524	7,500	10,374	N/A
F-111	26,000	35,965	17,000	23,515	N/A
T/OA--37	14,000	19,366	10,000	13,833	N/A
H-1	11,500	15,907	8,500	11,757	N/A
H-3	17,000	23,515	12,000	16,599	N/A

Notes:

1. Overhead based on it being 38% of TOTAL RCCF expenditure (see Table 3).
2. Cost figures extracted from Reference 20, "RCCF Cost Report, FY87-89."

*Indicates price of scuff sand and overcoat.

**Indicates price based on PMB stripping.

APPENDIX C

Table 3

Bergstrom RCCF Cost Breakout FY87-89

\$7,456,482

Based on 306 Aircraft--\$24,368 Average Cost

	<u>\$ Amount</u>	<u>Percent</u>
Contractor	\$4,598,780	62%
GFM/GFE	1,482,208	20%
Personnel	789,095	11%
Utilities	433,878	6%
Reimbursable	124,521	7%

Note: Overhead costs are considered to be all other than those paid to contractor--38.33%)

(As of 30 September 1989)

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GLOSSARY

ADF	Air Defense Fighter
ALC	Air Logistics Center
AFLC	Air Force Logistics Command
AFRES	Air Force Reserves
AFSC	Air Force Systems Command
ATC	Air Training Command
ECD	Estimated Completion Date
EPA	Environmental Protection Agency
GFE	Government Furnished Equipment
GFM	Government Furnished Material
LG	Deputy Chief of Staff Logistics
LGM	Director of Logistics Maintenance
MA	Deputy Commander for Maintenance
MAC	Military Airlift Command
MCP	Major Construction Project
MOA	Memorandum of Agreement
NGB	National Guard Bureau
PDM	Periodic Depot Maintenance
PDP	Program Decision Package
POM	Program Objective Memorandum
PMB	Plastic Media Blasting
QAE	Quality Assurance Evaluators
RCCF	Regional Corrosion Control Facility
RFP	Request for Proposal
SOW	Statement of Work

SPM	System Program Manager
TAC	Tactical Air Command
WG	Wage Grade
WS	Wage Supervisor
XPM	Director of Manpower